# The CHEMIST

APRIL, 1936 VOLUME XIII, NO. 4

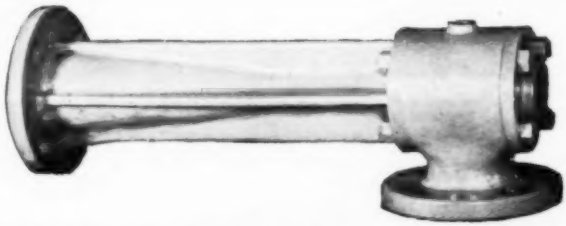
• • •

## ANNUAL MEETING

## BUFFALO, NEW YORK

May 9-11, 1936

• • •



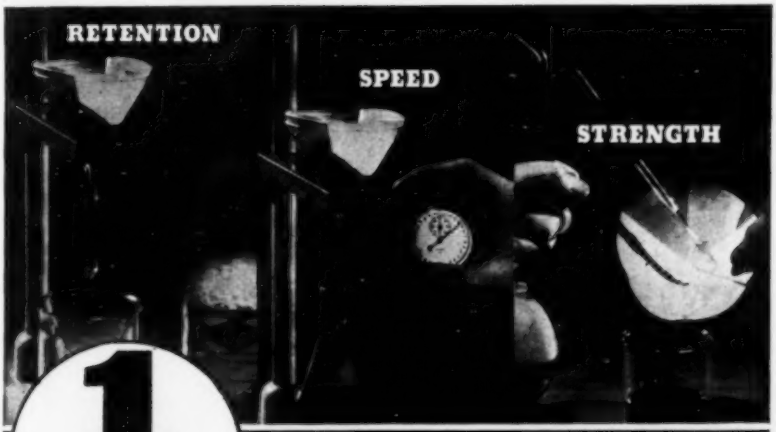
# MORE VACUUM—HIGHER VACUUM—MORE PROFITS

Steam Jet Evactors produce remarkable profits for their owners. In one case, a single stage Evactor weighing only 120 pounds replaced ten mechanical vacuum pumps weighing a total of 6,000 pounds, *and produced a higher vacuum.* While this is exceptional, savings have been substantial in every one of the many hundreds of cases where Steam Jet Evactors have been purchased to replace mechanical vacuum pumps. The total absence of moving parts and sealing oil is a big advantage. The operating efficiency at high vacuum is vastly better than with mechanical pumps.

Steam Jet Evactors can handle large quantities of vapor from evaporators, dryers, deodorizers, etc., and maintain a vacuum higher than that corresponding to the vapor pressure of the condenser water. Large shelf dryers equipped with Evactors are operating at absolute pressures of 6 mm. and less, vapor being compressed from this pressure to approximately 50 mm. where it can be easily condensed. Multi-stage Evactors are producing absolute pressures of 1 mm. and less on commercial processing units. The very moderate cost of the Evactors permits their application to many processes which are now operating at atmospheric pressure, thereby facilitating greater production efficiency and better quality of the finished product.

The Croll-Reynolds Chill-Vactor unit applies vacuum in the most efficient manner for chilling water and other liquids. The total combined capacity of Chill-Vactor units purchased in the past year is equal to the cooling effect of 2,000 tons of ice every twenty-four hours. Croll-Reynolds engineers have exceptionally broad experience in applying vacuum and vacuum refrigeration to process work.

**CROLL-REYNOLDS CO., INC.,**
17 JOHN ST., NEW YORK




# 1 GRADE for All Purposes

*Send for* **FREE TEST SAMPLE**

Simplify your filtration work with Baker & Adamson Grade "A" Filter Paper. It assures required retention in ninety-nine percent of all quantitative analyses. B & A Filter Paper is surprisingly speedy with troublesome fine precipitates as well as on coarser work. It is completely satisfactory for Iron or Aluminum. It retains difficult precipitates of Barium Sulphate and Metastannic Acid.

Baker and Adamson Grade "A" filter paper is processed in our own plant from finest stock, double acid washed with pure Hydrochloric and Hydrofluoric acids to cut ash content to the minimum.

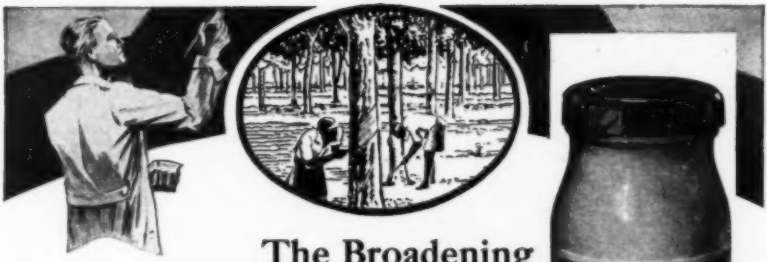
ORDER ANY DESIRED SIZE FROM ANY B & A SUPPLY HOUSE

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

**BAKER & ADAMSON** *Reagent Chemicals and C.P. Acids*

Your dealer will supply you, or write the nearest company office

GENERAL CHEMICAL COMPANY • 40 Rector St., New York



# The Broadening Scope of Rubber Sales—a Tribute to Chemical Research!

TODAY'S widened use for Rubber is a tribute to Chemical Research. Tomorrow's volume has also been safeguarded by the Chemist. In this march of progress, Baker's C.P. Analyzed Reagents, low in sulphur derivatives, have played an important role.

"BAKER'S ANALYZED" Mineral Acids, Barium Chloride, Potassium Chlorate and Sodium Peroxide are particularly well adapted for Sulphur determination because of their very low Sulphur and Sulphate content.

If the perchloric acid method is used, refer to IND. ENG. CHEM. *20*, 1234 (1928) Caoutchouc and Gutta Percha *24*, 13549 (1927) India Rubber World *61*, 356 (1920) Bu of Stds Cir *232*, 26 Ibid *232*, 25.

Never, in your tests, do you have to cope with minimum and maximum limits of impurities. Instead, you know the exact analysis of each Baker Reagent—with purity so high that it meets or exceeds A.C.S. specifications.

Over 60 of the leading Chemical Jobbers proudly stock and sell Baker's Analyzed Chemicals and Acids, your assurance of prompt deliveries and unvarying quality.

J. T. BAKER CHEMICAL CO.
PHILLIPSBURG, NEW JERSEY
New York Philadelphia Chicago

Because of low sulphur content and minimal impurities, Baker's Barium Chloride is one of the pivotal reagents for the determination of sulphur. Note the exact analysis on the label.

BAKER'S FINE CHEMICALS

A partial list of Tonnage Chemicals held under rigid control, at no price premium. Investigate.

Magnesium Oxide
Magnesium Carbonate
Potassium Bitartrate
Potassium Sodium Tartrate
Bismuth Subnitrate
Potassium Iodide
Alkali Bromides
Salicylates

SPECIFY AND INSIST UPON
"Baker's Analyzed"

# The CHEMIST

*Publication of*

THE AMERICAN INSTITUTE OF CHEMISTS, INC.

V. F. KIMBALL, *Editor*, 233 Broadway, New York City

VOLUME XIII APRIL, 1936 NUMBER 4

## TABLE OF CONTENTS

| | Page |
|---|---|
| **Welcome to Buffalo and the Niagara Frontier.** CHARLES F. SMITH, JR., F.A.I.C. | 483 |
| **Program. Annual Meeting** | 484 |
| **General Information** | 485 |
| **Chemical Industry in Buffalo-Niagara District** | 488 |
| **Influence of the Chemical Industry on Hydro Electric Power Development.** F. L. KOETHEN, F.A.I.C. | 489 |
| **Marston Taylor Bogert, Medalist.** FLORENCE E. WALL, F.A.I.C. | 492 |
| **The Chemist in Warfare.** LONNIE C. ELMORE, A.A.I.C | 499 |
| **Books** | 505 |
| **Believe it or Not Regarding Niagara Falls.** F. L. KOETHEN, F.A.I.C. | 508 |
| **Council** | 510 |
| **Chapters** | 512 |
| **Our New Members** | 512 |
| **Chemists Abroad.** J. N. TAYLOR, F.A.I.C. | 515 |
| **The Walrus and the Carpenter** | 517 |

THE AMERICAN INSTITUTE OF CHEMISTS
HOWARD S. NEIMAN, *Secretary*
233 Broadway
New York, N. Y.

Entered as second class matter April 8, 1936, at the Post Office at New York, N. Y., under Act of August 24, 1912.

Issued monthly except in June, July and August at 233 Broadway, New York, N. Y. Subscription price, $2.00 a year. Single copy, 25 cents.

Copyright, 1936, by The American Institute of Chemists, Inc.

## Objectives *of the* AMERICAN INSTITUTE *of* CHEMISTS

To give chemists professional solidarity.

To put the profession back of a definite code of ethics.

To insist on adequate training and experience qualifications.

To educate the public to an understanding of what a chemist is.

To protect the public and the profession by fighting quackery.

To raise the economic status of chemists.

---

HOWARD S. NEIMAN, *Secretary*
The American Institute of Chemists
233 Broadway, New York, N. Y.

Please send me an application blank for membership in the American Institute of Chemists.

Name.....

Position.....

Address.....

City..... State.....

# Welcome to Buffalo and the Niagara Frontier

By Charles F. Smith, Jr., F.A.I.C.

**The Chairman of the Niagara Chapter cordially invites the American Institute of Chemists to Buffalo for its Annual Meeting.**

A WARM welcome awaits members of the Institute and their families who come to Buffalo for the Annual Meeting. No convention of fifty times the magnitude has received more painstaking effort to crowd into a few days so much that is pleasant and profitable. Every member of Niagara Chapter is setting aside May ninth, tenth and eleventh for the exclusive entertainment of the visitors, and we guarantee that you will be fully repaid for any personal sacrifice which the journey entails.

Consider the program as a reversible reaction:

PROFESSION —— PLEASURE —— PROFIT

(We include profit because the contacts and plant visitations will amply justify the two-day absence from business.)

On Saturday, while the meetings are in progress, the ladies who do not wish to visit the stores and theaters surrounding the hotel, will be taken on a tour of Delaware Park, the beautiful Albright Art Gallery and the unique Historical Building.

A Sunday morning visit to Niagara Falls will be arranged for those desiring to return in time for the International League baseball game between Buffalo and Albany. For the late sleepers, automobiles will leave early Sunday afternoon, going by way of the Peace Bridge and the Canadian boulevards, and returning via the new Grand Island bridges. Any who wish may remain until night to see the spectacular illumination of the Falls. Visitors who desire to inspect the historic Fort Niagara at the mouth of the river overlooking Lake Ontario, will be given that opportunity.

A large number of plants in Buffalo and Niagara Falls will be open for inspection on Monday. Special efforts will be made to secure admission to others not already listed. For the ladies, visits to the University of Buffalo, the Museum of Science in Humboldt Park and to other points of interest will be arranged. Your low-rate, week-end tickets are good until midnight, May 11th, so do not miss the important events scheduled for Monday.

CHEMISTRY HALL LIBRARY

## Program

## ANNUAL MEETING, BUFFALO, NEW YORK

Headquarters: Hotel Statler

**Saturday, May 9th**

9:00 A.M., Registration

10:00-12:00 A.M., Papers and Discussions

FRANK G. BREYER, F.A.I.C. (New York Chapter)
"Forty-five and No Job"
Speaker to be Announced (Washington Chapter)
MAX TRUMPER, F.A.I.C. (Pennsylvania Chapter)
"The Chemical Frontiers"

MAURICE C. TAYLOR, F.A.I.C. (Niagara Chapter)
"The Industrial Research Chemist's Balance Sheet"

12:30-1:30 P.M., Luncheon meeting of National Council

2:00-3:00 P.M., Address. William J. Cotton, F.A.I.C.
"Opportunities for Service by the Institute"

3:00-5:00 P.M., Annual Business Meeting

6:30 P.M., Annual Banquet. Presentation of the Medal of The American Institute of Chemists to MARSTON TAYLOR BOGERT, F.A.I.C.

Address: M. L. Crossley, F.A.I.C.
"Privileges and Obligations of the Chemical Profession"

Address: R. R. Renshaw
"The Medalist"

Address: Marston Taylor Bogert, F.A.IC.
"The Onward March of Synthetic Organic Chemistry"

**Sunday, May 10th**
Trips to Niagara Falls

**Monday, May 11th**
Plant visits

*Buffalo Civic Center*

# Routes to Buffalo

## By Automobile

### From Washington, D. C.

U. S. 240 to Frederick. U. S. 15 to Muncy. Pennsylvania 14 to Montgomery. Pennsylvania 404 to Williamsport. U. S. 15 to New York line. N. Y. 2 via Painted Post to Wayland, N. Y. 39 to Dansville. N. Y. 36 to Greigsville. N. Y. 63 to Pavilion. N. Y. 19 to Batavia. N. Y. 5 to Buffalo.

### From Philadelphia, Penna.

U. S. 611 to Scranton. U. S. 6 to Towanda. U. S. 220 and

U. S. 309 to Waverly. N. Y. 17 to Elmira. N. Y. 17-E to Big Flats. N. Y. 17 via Corning to Painted Post. Painted Post to Buffalo—see above.

**From New York, N. Y.**

New York to Jersey City, N. J. Follow Bloomfield Avenue to U. S. 46 to Portland, Penna. U. S. 611 to Scranton. Scranton to Buffalo—see above.

## By Train

From New York to Buffalo, via Erie, Lackawanna, and Lehigh Valley Railroads, round trip, week-end excursion rate tickets may be obtained for $19.10, which are good from Friday to Monday, inclusive. Via the New York Central, the week-end excursion rate ticket costs $21.00. Pullman accommodations on all lines are $5.63 round trip, or $3.75 one way, for lower berth, and $4.50 round trip for upper berth.

From Philadelphia to Buffalo, via Pennsylvania or Lehigh Valley Railroads, the week-end excursion rate is $20.00. Pullman costs $3.75 for lower berth one way.

From Washington to Buffalo, via Pennsylvania Railroad, the week-end excursion rate is $20.95. Pullman is $4.50 for lower berth, one way.

## Hotels

The Hotel Statler has been selected as headquarters for the Annual Meeting. The rates are $3.00 and up for single rooms, $5.00 and up for double rooms, and $6.00 and up for rooms with twin beds.

Men may also be accommodated at the Buffalo Athletic Club at the rate of $3.00 a day, if reservations are made through Mr. Charles F. Smith, Box 365, Buffalo, N. Y.

## Visits to Canada

Those who attend the Annual Meeting will be interested in the following letter received from Mr. T. Magladery, Deputy Minister of Immigration, Ottawa, Canada:

"I have learned with much interest that the American Institute of Chemists will hold its convention in Buffalo, N. Y. As the

delegates to this convention and their friends who may accompany them will be just a short distance from Canada, it seems probable that they may wish to take advantage of the opportunity to pay a brief visit to this country, and it is in that connection I venture to offer any assistance at my command.

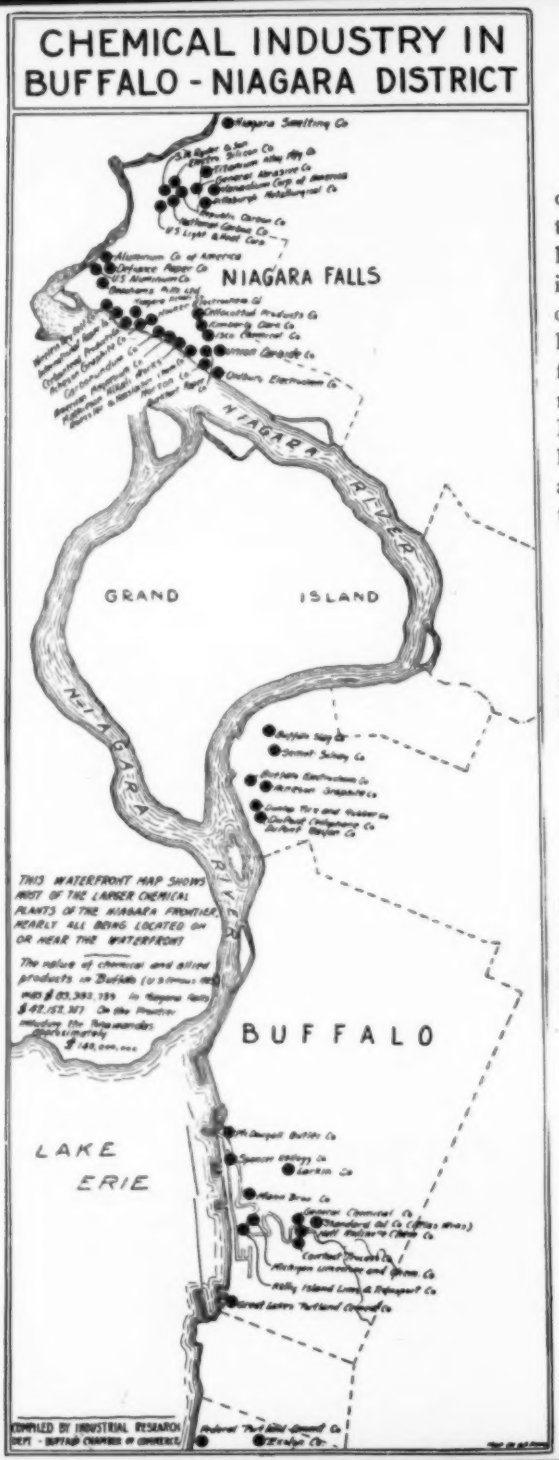
"The Department of the Canadian Government with which I am associated is charged with the duties connected with the admittance of tourists and others into the Dominion. The regulations are very simple and reasonable. May I make it quite clear that only the duty of guarding against the admittance, in the guise of tourists, of persons who are not legally admissable necessitates any regulations at all, as it is the policy to make the movement of bona fide tourists crossing the border into Canada just as free of "red tape" and restriction as possible.

"Persons who are citizens of the United States and who are entering Canada as tourists may expect no inconvenience whatever. In the case of any of your delegates or their friends who are not citizens of the United States, and who wish to pay a visit to Canada, it would be well for them to be in a position to satisfy the Canadian officer at the International boundary that they are legally resident in the United States and will have no difficulty in returning to your country. Tourists' automobiles are admitted without charge and may be driven for pleasure under their State licenses in Canada for a period of sixty days, which period may be extended upon application. . . .

"Instructions will be in the hands of our Inspectors at the points concerned, to facilitate the admittance of your delegates and their friends in every way consistent with the regulations."

## Position Wanted

Young woman, F.A.I.C., at present unsuitably employed, wishes position — teaching, research, analytical. Start any salary from $25.00 — permanent position with future both in responsibility and salary. Former university teaching fellow, high school teacher, food chemist. Address pH 8.6, 1579 Atlantic Ave., Brooklyn, N. Y.


CHEMICAL INDUSTRY IN
BUFFALO - NIAGARA DISTRICT
NIAGARA FALLS
NIAGARA RIVER
GRAND ISLAND
NIAGARA RIVER
BUFFALO
LAKE ERIE
THIS WATERFRONT MAP SHOWS MOST OF THE LARGER CHEMICAL PLANTS OF THE NIAGARA FRONTIER, NEARLY ALL BEING LOCATED ON OR NEAR THE WATERFRONT
COMPILED BY INDUSTRIAL RESEARCH DEPT. - BUFFALO CHAMBER OF COMMERCE

## Notes

Chemical and allied industries of Buffalo and the Niagara Frontier are large and increasing in importance. More than one hundred million dollars worth of these manufactures is produced annually in Buffalo and Niagara Falls and millions more along the Niagara River between the two cities.

The Grosvenor Library in Buffalo has a notable collection of references in medicine and chemistry.

Buffalo has the greatest hydro electric power development in the world, developing eleven million horsepower a year.

Key industries of the Buffalo and Niagara districts are steel, lumber, grain, rubber, and chemicals.

# The Influence of the Chemical Industry on Hydro Electric Power Development

By F. L. Koethen, F.A.I.C.

**A chemical engineer of the R. & H. Chemicals Division of E. I. du Pont de Nemours and Company, at Niagara Falls, tells what the chemist has contributed to hydro electric power development in that section.**

WHEN one comes to the Niagara Frontier and finds it the world's greatest electro chemical center, he is apt to consider it an old established thing ordained by God for the benefit of certain stockholders. Yet as a matter of fact, the beginnings of these industries were within the memories of many men now living and the story of their development is rich with human interest and historical value. The writer has enjoyed gathering from some of the authorities still available this story and the part contributed to it by chemists.

When the construction of the Niagara Falls Power Company's first plant was begun on October 4, 1890, no one knew how such a large amount of power could be transported and used satisfactorily. Electric generating plants which had preceded it were relatively small and the power was used within a very narrow radius, for lighting or for mills of various sorts. One electrochemical usage, silver plating by the Oneida Community, Ltd., had been carried on at Niagara since 1881 with current from the 250 H.P. brush generator of the Hydraulic Power Company, located eighty-six feet down the bank, but other industries were of the mechanical type, flour mills, paper and printing plants. They did not use the full available "head" of the water they took from the river, because they could not stand so much pressure.

It is hard to believe that rope drives, compressed air, and even electrolytic hydrogen and oxygen, were seriously considered as a means of transmitting the new power to Buffalo, yet such was the case. The larger city twenty-five miles to the South had offered a prize of $109,500 for delivery of Niagara power. An international commission of famous scientists was detailed to study the question. It was at this juncture (1893) that George Westinghouse came forward as the champion of the alternating current system

of transmitting power. A few small installations of alternating current had previously been made at scattered points in the world, nearly every installation a different cycle but all were small capacities and short lines. Edison and Lord Kelvin recommended direct current. Westinghouse built three generators of 5000 H.P. and 2000 volts each, set vertically and connected to turbines 165 feet underground. They ran at 250 r.p.m. and the generators were made with 12 poles, hence the current alternated twenty-five times per second. This was a bold thing to do at the time. Later, a frequency of sixty cycles was found more suitable and was generally adopted wherever the change was feasible.

A young student was recently heard to ask, "Why does Niagara have to be different, using twenty-five cycle current, when everyone else uses sixty cycles?" This young man had "the cart before the horse." For some years, the connected load at Niagara exceeded that of all of the rest of the world, and each additional piece of equipment tied into the system made a change of frequency more difficult.

Just before this first large supply of power became available, the chemical developments in various parts of the world had opened up many possible uses for it. Charles M. Hall, in 1886, just graduated from Oberlin, had invented the process for making aluminum by electrolysis of fused salts. Hall's Pittsburgh Reduction Company became the first customer for the new power plant, August 5, 1895.

Edward G. Acheson, who had worked in Edison's laboratory on the incandescent lamp and had had a part in founding the Standard Underground Cable Company, invented Carborundum in 1891 and had been making the new abrasive at Monongahela City, Penna., with a 150 H.P. lighting generator. He became the second customer for Niagara Power, using 1000 H.P. Graphite, whose electrical production he had also discovered in 1891, was not made commercially until 1897.

The newly developed calcium carbide (invented in 1892 by Willson at Spray, N. C.) was also moved to Niagara promptly when power became available. By December 15, 1896, the new power company had contracts for 15,825 H.P. from a rated capacity of 15,000. Of this amount, Buffalo, from whence the large demand had been expected, had taken only 1000 H.P.

THE NEW electrochemical industries, practically overnight, had assured the success of one of the most daring projects in the history of American development.

A rapid growth in power facilities followed. In 1901, the Pan American Exposition, in a blaze of electric lights, focused the attention of the world on Niagara power.

Other electrochemical industries came in great numbers. In 1897, the Castner process for making caustic soda, using a rocking cell and a mercury cathode, pioneered in the electrolytic alkali business. This plant is now the Mathieson Alkali Works. The National Electrolytic Company made potassium chlorate with 2500 H.P. direct current generated by a new installation on the Hydraulic Canal. The list of industries grew rapidly, to make the Niagara frontier the world's largest center for electrochemistry.

The chemical development on the Niagara frontier produced a profound change in the population of the area, not merely in members but also in its nature.

The building of the Power House and tail-race tunnel left its trace on the section of Niagara Falls still known as "tunnel-town". The less said about this the better.

The type of industry on the whole Niagara Frontier changed. In the new industry, the products could no longer be evaluated by the ordinary senses of sight and touch—the chemist was needed to judge them and to control them. Not only were more trained men needed, but a larger proportion of them rose to executive control. Inevitably, the chemist moved into more important places in the community, places of leadership in schoolboards, churches, music, and general culture.

**Summary**

Chemistry was waiting for Niagara power to be available.

Chemistry assured its success.

Niagara Frontier chemists were influential in securing better recognition for the profession as a whole.



Photographs of Buffalo in this issue of THE CHEMIST are loaned through the courtesy of the Buffalo Chamber of Commerce.

# Marston Taylor Bogert — Medalist

## By Florence E. Wall, F.A.I.C.

IT IS comparatively rare nowadays to find a man "born with a silver spoon in his mouth" who has acquired a genuine taste for chemistry. Or who, having acquired the taste, has persisted in making a life work of chemistry, when it is so much easier to play at it as a dilettante, or remain the amateur and endow the work of others.

Viewed objectively today, Marston Taylor Bogert, F.A.I.C., Professor of Organic Chemistry at Columbia University, Institute Medalist for 1936, stands out as a chemist who has had both an unusual opportunity and a phenomenal capacity to "live life abundantly". He is, first of all, a good American citizen, who has always given generously of his time and his talents in any branch of public service where they might be needed. But, superimpose successively on this, the images of a landed country gentleman, an accomplished linguist, a cosmopolite and diplomat of the first order, an all-round athlete and lover of outdoor sports, a distinguished college professor, a delightful after-dinner speaker, a devoted husband and father, and a world-renowned organic chemist, and behold a composite picture which makes the average person wilt at the mere thought of all the energy such a life requires.

Although he was a "Saturday's child", Dr. Bogert was well endowed with material things in early life; but he did not always have the energy. Looking at him now, one would never imagine that he was a puny, delicate child, of whom it was fearsomely said that "he would never live to grow up". Instead of just moping around, waiting for this dire prophecy to overtake him, the youth decided to foil it. He went to a gymnasium for a systematic course of intensive physical exercise, and is today an exuberant and thriving example of that philosophy of education —old as the ancient Greeks, modern as the physical educators of tomorrow—which preaches *mens sana in corpore sano.*

Marston Taylor Bogert was born at Flushing, New York, on April 18, 1868, of an old Dutch family. His first American ancestor came from Schoonderwoerd, near Leerdam, Holland, in 1663; and many of the later ones established records for hard work and accomplishment, and both military and civil service in the

early days of the Colonies. Particularly interesting is a note that a certain young Bogert lady of two hundred years ago married a Roosevelt, and became, in turn, the the ancestor of the late President Theodore Roosevelt.

DR. BOGERT received all his early education in private schools at Flushing. To those early days can be traced his great love of nature; and in his last year at the Flushing Institute he had his first taste of chemistry.

In 1886—fifty years ago next September—our medalist entered Columbia College as a freshman in the classical course. He specialized in languages, both ancient and modern, taking honors now or then in German, Italian, and Spanish. The total list of academic honors won during his undergradute days would make one suspicious that here was the perfect college "grind"; but he matched each academic honor with one in sports — crew, field events, football, what-not—or some other college activity. He was president of his class for three years, and chairman of the entire student body, at the installation of President Seth Low during his senior year. As one of his colleagues has said, "In every way, Bogert was marked as the member of the class who ought to succeed. In spite of this handicap, he did succeed."*

He was graduated in 1890, with the degree of Bachelor of Arts, and spent the summer in travel around Europe—the "college education and the Grand Tour", which were considered adequate preparation for life by the typical gilded youth of the day. His exceptional ability in languages had prompted Professor Bojesen, of the Department of Germanic Languages, to offer him a position as Assistant; but this offer was declined, because he had always remembered the experiments in chemistry which he had seen at the old Flushing Institute, and had made up his mind to learn more about this fascinating subject.

Accordingly, the future scientist entered the Columbia School of Mines, in the fall of 1890, as a freshman in the course of Analytical and Applied Chemistry, and went through another complete undergraduate course. Academic honors continued to accumulate; the record for all those 100's is simply appalling. Discretion and etiquette forbid inquiry as to the one course that

* *Ambassador to the World*, by D. D. Jackson, THE CHEMIST, November, 1931.

marred the record in senior year, but since "in that one a mark of 100 had never been given", his reputation remains unblemished.

During his senior year, the teacher of organic chemistry (Adjunct Professor Charles E. Colby) fell ill; and since there was no one to take his place, this enterprising student suggested that the class organize itself for mutual aid. Each member made an intensive study of some division of the subject matter, and they actually finished the year by teaching themselves and one another.

Upon the completion of this second course, in 1894, he was granted the degree of Bachelor of Philosophy. This *Ph.B.* is often taken for a typographical error, but Professor Bogert always admits frankly that he never went through the kind of graduate work and research for the Ph.D. toward which he has guided so many of his own students. He has been thrice "doctored", but they are all honorary degrees: LL.D. (Clark, 1909); R.N.D. (*Rerum Naturalium*, Charles University, Prague, 1928); and Sc.D. (Columbia, 1929).

After this second graduation, Dr. Bogert became the Assistant in Organic Chemistry at Columbia. He advanced rapidly through the various grades and in 1904 was made the first Professor of Organic Chemistry at the University. Since the death of Professor Chandler (1911) he has been Senior Professor of the Department of Chemistry.

FROM 1904 on, the accomplishments of our medalist are best recounted in phases, or separate manifestations; and synthetically, by tracing each according to the "vertical method", and then weaving all the strands together. Any attempt to trace out the horizontal pattern of his life during any year might seem like trying to chase a lively chameleon over a Paisley shawl.

Professor Bogert early became interested in the structure of organic compounds, particularly the aromatic compounds, and the relationships between structural formula and chemical properties. He waxes enthusiastic in any conversation on the subject of synthetic organic chemistry, and the ramifications that unite this branch of study with biology, pharmacology, and medicine. He has never published a book, but his contributions to scientific literature number about four hundred articles, most of them on the subjects of his own research. From the breadth of his own knowl-

edge, he has been able to direct his students in a wide diversity of research problems. Among these have been several on perfumes and essential oils, under fellowship grants from Fritzsche Brothers,* and the American Manufacturers of Toilet Articles.

As an interpreter of science, either as the teacher in his classroom or the lecturer to scientists and laymen outside, Professor Bogert is an artist. His early classical education is manifested in his ease and clarity of expression, his beautiful diction, and the Latin and Greek which are often identified as the background of the vocabulary of modern science. Add to this his perennial good humor, his ready wit, and his wealth of timely stories, and one can readily understand his popularity as a speaker anywhere, with every type of audience.

Around Columbia, Professor Bogert's activities have extended far beyond his laboratory—to the University Council, many boards and committees of the faculty, Alumni affairs, and friendly professional association with teachers in other fields. He belongs to the fraternity of Delta Phi; and to honor societies of Phi Beta Kappa, Sigma Xi, and Phi Lambda Upsilon. That Columbia appreciates her faithful son was shown by the presentation to Professor Bogert, in March 1936, of the large scroll of the Alumni Association of the Graduate Schools, "for having distinguished himself as professor, lecturer, author, and chemist."

It is as a protagonist in the unfolding romance and drama of the science and profession of chemistry in America that Dr. Bogert has enjoyed another career of distinguished service. Since 1894, he has been active in the American Chemical Society, serving as President of it in 1907 and 1908, and for several years now as a Councilor and an editor of its journals. When he entered this office, the industrial chemists were planning to split off and form a separate organization. To prevent this, President Bogert established the *Journal of Industrial and Engineering Chemistry,* and inaugurated the present divisional system, which makes it possible for any chemist to find some congenial group within the Society. He was awarded the Nichols Medal in 1905.

During his second year as President of the Society, President Roosevelt called him to the conferences on Conservation of Natural Resources; at the second one, he addressed all four divisions—

* See *The Contribution of the Chemist to the Cosmetic Industry . . . by* Florence E. Wall, F.A.I.C., THE CHEMIST, April, 1935.

Forests, Land, Minerals, and Water—emphasizing the contribution of chemistry toward the solution of technical problems in each.

AMONG other scientific organizations in which he has either held office or been an active member, are the American Association for the Advancement of Science, American Philosophical Society, the National Academy of Sciences, National Institute of Social Sciences, American Academy of Arts and Sciences, the American Institute of the City of New York, and the Washington Academy of Sciences. He was elected Fellow of The American Institute of Chemists in 1929.

All this evidence of interest in the scientific affairs of the nation led logically to a war record of no mean accomplishment. Early in 1917, Dr. Bogert organized and became chairman of the Division of Chemistry and Chemical Technology of the National Research Council. He served as consultant to several departments of the Government, and before long was appointed Chief of the Chemical Service Section with the commission of Lieutenant-Colonel. When all the chemical units were consolidated into the Chemical Warfare Service, he was promoted to Colonel, and thereafter served either simultaneously or successively on several important boards and commissions. "The Colonel", as he is still affectionately called by many of "his boys" and other friends, was honorably discharged from the Army in 1919, but he still serves as consultant to the Chemical Warfare Service, and to important government bureaus.

Young things, who catch their first glimpse of Dr. Bogert at the Annual Meeting for the presentation of the Perkin Medal, are sometimes startled into a titter at the unexpected sight of a purple tie with an otherwise impeccable evening attire. Can this be one of our typical absent-minded professors? And is he allowed to reach for a tie in the dark? A discerning look at the keen face above the sartorial incongruity dispels any suspicion of the absent-mindedness; and there is always someone nearby who explains that that is no mere "purple tie", but an historical item of haberdashery, in the famous Perkin's own famous *mauve*, which commemorates Dr. Bogert's work on the Executive Committee, when the eminent English chemist visited New York in 1906, for the Golden Jubilee of his wonderful discovery.

THUS does Manifestation Number Two merge into one of larger proportions—the international figure. Through his interest in the Society of Chemical Industry (British), he became an ardent supporter of international co-operation in science. He is also a member of the Chemical Society of London; and of chemical societies of France, Italy, Czechoslovakia, Poland, Switzerland, and the Netherlands.

Dr. Bogert progressed through various offices to the Presidency of the Society of Chemical Industry in 1912-1913, being the third of five Americans who have been thus honored to date. A characteristic story is told about him as presiding officer of the Annual Meeting at Liverpool: The reception by the Lord Mayor, and the solemn procession into the dining hall had been accomplished without mishap, when suddenly the formidable major-domo who directs the verbal traffic at all such public affairs, bellowed forth that "the President would now ask a blessing". Such an unexpected announcement might have routed some of our pagan brethren, but Dr. Bogert, already an Elder in the Reformed Church of his doughty Dutch forebears, was able to rise and pray for them as fervently and as competently as he does everything else.

In 1927, Dr. Bogert was designated as the first Visiting Carnegie Professor of International Relations at the Charles University, Prague, Czechoslovakia. Dr. Nicholas Murray Butler, Chairman of the Carnegie Endowment for International Peace, wanted a lecturer on science who could also serve as an ambassador of international goodwill. That the mission was a success was attested by the degree, diplomas, and medals bestowed on Professor Bogert by the universities of Czechoslovakia, the Order of the White Lion, which was conferred on him by the government, and the magnificent Bohemian glass, which was presented to the "lady ambassadress".

For of course Mrs. Bogert was with him. Throughout his crowded professional and public life, Dr. Bogert has had the companionship and co-operation of the charming and gracious lady who, as Miss Charlotte E. Hoogland, became his wife in 1893. They have two daughters: Annette (Mrs. Frank B. Tallman); and Elise (Mrs. Frederick K. Huber). He loves his home life. The family say that he is a delightful person to have around the house, and that he actually does spend some time there. Each June, the Bogerts leave New York for their thousand-acre estate at Belgrade

Lakes, Maine, where "the Colonel" spends his summer in boating, fishing, tending his peonies—and presiding over the Belgrade Lakes Association.

He is a frequent visitor at The Chemists' Club, of which he was a founder, and a President in the early days. He is also a member of the Century Association, the Columbia Yacht Club, the Holland Society, the Augusta (Maine) Country Club, the Megantic Fish and Game Club, and the Hunters' Fraternity of America.

Dr. Bogert so well exemplifies the old adage, "If you want a thing done, give it to a busy man". Occasionally he feels that having so many diversified interests may seem like "spreading himself too thin"; but the substance is there. If he joins any organization, movement, or cause, it means that he is both qualified and willing to work for it. He has a way of levitating through successive offices, and his efficiency carries its own guarantee that whatever it is will be done well.

IT MIGHT SEEM, too, as if anyone that lives so full a life could never accomplish anything in university work, but the lengthening roster of eminent and capable chemists who have worked with Professor Bogert shows that he is first and last the educator, and always the research scientist.

The latest developments of his work on perfumes are extending themselves beyond the associating of organic structure with odor to the importance of the olfactory sense in the defense mechanism of the body; and thus they are rapidly opening up broad new vistas of application in biochemistry and therapeutics. The implications are keenly interesting to Dr. Bogert, who believes that one of the noblest purposes of chemistry is to render service to medicine for the alleviating of human suffering.

The citation of this award of the Institute Medal "in recognition of his outstanding service as a teacher and as an investigator in the field of organic chemistry" seems merely like an X-ray photograph of Marston Taylor Bogert, as his friends and professional colleagues really know him. He might well rate a medal just "for being himself"—a chemist who is so much more than just a chemist, one who looks upon his test-tube, not as his whole little world, but as a bit of magic glass which reflects the whole great world beyond his laboratory windows, and magnifies the opportunities where he and his science can be of service to mankind.

# The Chemist in Warfare

By Lonnie C. Elmore, A.A.I.C.

**A Lieutenant of the Officers' Reserve Corps of the United States Army discusses the part played by the chemist in warfare.**

SINCE the beginning of time, man has devised methods by which he could better protect himself, either by natural or artificial methods. From the three great stages in the history of the human race, namely, the old stone age, the new stone age, and the age of metals, man has developed another age which can justly be called the age of science. And during this last age, man has developed and devised science not only for his advancement in time of peace, but also for his protection in time of war.

As far back as history goes, "scientists" have played a leading part in the defense of mankind. During the seige of Plataea in 428 B.C., the Spartans saturated wood with pitch and sulphur and burned it under the walls of the city in the hope of choking the defenders in the defense of their city. Charles XII of Sweden crossed the Dvina River in 1701 under the smoke screen produced by burning damp straw. During the Crimean War of 1855 in the seige of Sebastopal, the English considered using sulphur fumes against the Russians, based upon the recommendation of Admiral Lord Dundonald, who in 1811, had been impressed by the deadly character of the fumes in Sicilian sulphur kilns. On June 22, 1864, Forrest Shepherd, a New England geologist, wrote to President Lincoln suggesting the use of strong sulphuric acid mingled with strong hydrochloric, or muriatic acid, on a broad surface like a shovel or shallow pan, forming a dense cloud, in the hope that this method would drive the Conferedates from their defense about Petersburg, Virginia.

The use of chemicals in warfare is another achievement of the chemist. As scientific methods have changed to meet existing conditions in the advancement of mankind, so also have scientific methods changed to meet the conditions of warfare, and so will they continue to change until the last war has been fought. At present, the use of chemical agents in warfare is being taught in all of the large world powers. The United States Chemical Warfare Service was created on June 28, 1918. England has a unified

chemical warfare service which functions for the army, navy, and air service. Chemical warfare instruction is given to all branches of the French army. Italy has a unified chemical warfare service which functions under the ministry of war for the army, navy, and air service. In Germany, the chief of the munitions section of the war ministry is charged with gas warfare. The Soviet chemical warfare service functions for the ministry of defense, which includes the army, navy, and air corps. Japan has trained a large number of officers at the Imperial University of Tokio, and research is carried out in the Army Scientific Research Institute.

In the United States, rapid progress and research has been made in building up an adequate Chemical Warfare Service. The Chemical Warfare Service is listed among the noncombatant services, but it is also charged with the organization, equipment, training, and operation of special chemical troops. The organization includes the Office of the Chief of the Chemical Warfare Service, Edgewood Arsenal, Maryland, the First Chemical Regiment and detached companies; the Edgewood Chemical Warfare Depot; the Chemical Warfare Board; the Chemical Warfare School; procurement districts, units of the Organized Reserves; two units of the Reserve Officers' Training Corps, and Officers detailed as additional members of the General Staff.

THE WORK assigned to the Chemical Warfare Service is to put into practical application the chemical agents issued for combat, and to instruct members of other branches of the service in protective measures against chemicals. The following facts concerning chemical agents are pertinent:

Chemical agents, more than any other weapons, are influenced by weather conditions. However, no general weather rules can be drawn to fit all agents. Weather has the least effect when persistent agents are used to drench the ground and vegetation, and when it is desired that they remain on the surface as long as possible. Under these conditions, the agent acts chiefly by direct contact with the skin, and less by inhalation. The weather is determined by six factors which are called the weather elements: Wind, temperature, clouds, precipitation, humidity, and pressure.

Wind is the most important in its effect on non-persistent chemical agents. No enemy can launch a cloud gas attack effective-

ly, if the wind is blowing toward them. And equally as important is the moment of the velocity of the wind. Winds with a velocity of less than four miles per hour are subject to change. Winds greater than twelve miles per hour are likely to break up the gas clouds and disperse them. Warm, sunny days are likely to make non-persistent agents less effective. Since the temperature of the earth is greater than that of the air on a warm day, the ascending air currents are formed which carry the gas upward and cause it to disperse. Cool, cloudy days are more favorable for the use of a chemical agent, especially at night when winds and ascending air currents are ordinarily absent. At such times, the gas tends to flow into and collect in valleys and depressions in dangerous concentrations.

Clouds cut off the sunlight and prevent heating of the ground and consequent connection currents, and are more favorable for the use of non-persistent gas.

Heavy rains wash away, hydrolize, and destroy persistent agents. Non-persistent agents are washed from the air. Irritant smokes are affected only by very heavy rains which wash the smoke particles from the air.

Humidity and pressure have very little effect on chemical agents except that they may increase the effect of screening smokes, as under conditions of light rain, and they control vertical air currents and the winds.

THE AGENTS used by the Chemical Warfare Service fall under different classifications based upon their physiological effect, tactical employment, persistency, and physical state under ordinary conditions.

In the physiological effect the action of the chemical agents tends to be specific in the sense that it is limited to particular parts of the body. Agents are therefore grouped into classes according to their physiological effect upon the human body, as:

**Lung irritants,** or those chemicals which, when breathed, cause irritation and inflammation of the interior cavity and the bronchial tubes and the lungs.

**Vesicants,** or those chemical agents which are readily absorbed or dissolved, in the exterior parts of the human body, followed by production of inflammation, burns, and the destruction of tissue.

**Lacrimators,** or chemical agents which cause a copious flow of tears and intense, though temporary, eye pains.

**Sternutators,** or those chemical agents which produce violent sneezing and coughing followed by temporary physical disability.

**Screening smokes,** which have no physiological effect but are used mainly for tactical purposes.

In the first classification, lung irritants, we have three main chemicals: Chlorine, Phosgene (Carbonylchloride) and Chlorpicrin (Trichlornitro-methane).

Chlorine is a yellowish green gas with a pungent, irritating odor and has an irritating and corrosive effect upon the lining of the nose, throat, and lungs.

Phosgene is a colorless gas with a sweet odor which resembles that of green corn.

Chlorpicrin is a yellow or colorless liquid with an unpleasant sweetish odor similar to that of flypaper.

In the second classification, or vesicants, we have Mustard Gas, (BB' dichlorethyl sulphide) and Lewisite (B chlorvinyldichlorarsine).

Mustard is a dark oily liquid with a high boiling point and low vapor pressure at ordinary temperatures. It has an odor resembling horseradish. It has a delayed action from two to six hours and persists on the ground for a period of several days to several weeks.

Lewisite is a dark green liquid that has a vesicant action similar to that of mustard. It is highly persistent and the odor resembles that of geraniums. It produces burns of a grayish color and causes arsenical poisoning on being absorbed into the body.

In the third classification, or lacrimators, we have Bromobenzylcyanide and Chloracetophenone (Phenylchlormethylketone).

Bromobenzylcyanide is a dark brown, heavy liquid with a high boiling point and has an odor like sour fruit.

Chloracetophenone is a white solid with a sweet aromatic odor.

In the fourth classification, or sternutators, we have Sneeze Gas (Diphenylchlorarsine) and Adamsite (Diphenylaminechlorarsine).

Sneeze Gas is a white solid when pure, but the plant product is a black liquid with an odor similar to that of black shoe polish.

Adamsite is a canary yellow solid when pure, but the plant

product is a dirty dark green, the smoke having an irritating, "smoky odor".

In the fifth classification, or screening smokes, we have White Phosporous, Titanium tetrachloride, and Hexachlorethane candles.

White Phosporous is a soft, odorless, waxy, yellowish white solid. It is broken into fragments by the bursting charge of the shell in which it is contained and these pieces burst into flames spontaneously when exposed to the air.

Titanium tetrachloride is an orange colored liquid which is not inflammable, and forms smoke by reacting with water vapor in the air. It is carried by planes in monel metal tanks and may be released at the will of the pilot.

Hexachlorethane candles are used mainly for small smoke screens, and the container is a tin can about the size of a tobacco can.

IN THE TACTICAL employment of chemical agents, there are four classifications according to their use.

**Casualty agents,** or those agents of such physical and chemical characteristics that a dangerous or killing concentration can be set under conditions encountered in the field.

**Harrassing agents,** or those agents used to force masking and thus slow up operations in the enemy lines.

**Screening agents,** or those agents which when burned, hydrolized, or atomized, produce a dense smoke in the air, and are used for the purpose of screening the movements of troops from observation by the enemy.

**Incendiary,** or those materials which when exposed to the air, or upon ignition following by the rupture of the container, generate sufficient heat to cause the ignition of ordinary dry carbonaceous substances with which the agent is in contact.

**Non-lethal agents,** or agents which exert a profound irritating or warning action at a concentration far below that required to produce death or seriously endanger health.

An agent is persistent if within ten minutes after its release in the open, under conditions which are favorable for the use of that agent, there is sufficient of the agent remaining at the point of release to necessitate protection for personnel in the vicinity. If at the end of ten minutes there is not enough of the agent at the

point of release to require protection, then the agent is considered as non-persisent. Persistency depends upon the rapidity of evaporation, which in turn, depends upon the boiling point of the agent, upon the weather, and nature of the terrain. Persistency is favored by the following factors: Low vapor pressure, high boiling point, low temperature, low wind velocity, ground protected by rank vegetation, overcast dry weather, and the stability of the agent to hydrolysis.

Persistent agents are slightly volatile agents which when scattered on the ground, give off their vapors very slowly. An area thus treated will remain dangerously infected for a long time. Agents of this type are especially useful in harrassing an enemy and preventing him from attacking over, or occupying areas drenched with them.

Non-persistent agents are gases at ordinary temperature, and when released from containers are carried by the wind and air currents. If the air is relatively still, and when the wind is light or as found in dense woods, such an agent might persist for some time, but in the open or when the wind is blowing, it will dissipate quickly. Non-persistent agents can be used to a great advantage against positions which are to be attacked shortly afterwards.

IN ORDER for a chemical compound to be an efficient chemical warfare agent it must fill certain and specific requirements:

1. It must be highly toxic, and concentrations in the field must be attained so that the agent will be lethal or casualty producing.

2. It must have a vapor density greater than that of the air. A gas heavier than air will settle into low portions of the terrain and will diffuse slowly; while a gas lighter than air would not remain near the ground where it would be effective against personnel.

3. If the substance is a gas under ordinary conditions, it must be easily compressed to a liquid and easily vaporized when the pressure is released. Liquids should be sufficiently volatile so that effective concentrations can be obtained in the field.

4. It must be capable of manufacture on a large scale. Very large quantities are required in warfare and while many substances which are highly toxic can be made in the laboratory, their production on a large scale may be impracticable.

5. Raw materials should be cheap and readily available without importation. Trained technical personnel and labor required for the manufacture of chemical agents should also be available.

6. It should be comparatively stable in contact with moisture.

7. It should have little or no corrosive action on the common metals.

8. The substance will be more efficient as a chemical warfare agent if the quantity required to produce a desired effect is relatively low.

These are the contributions which the Chemist has made to the defense of his country. As the man in uniform fights in time of war, so also does the Chemist fight to help those soldiers make their defense more secure and their offense less difficult. Although the Chemist may not march before the cheering throng, to the tune of wartime music, and though he receives no medal for his heroism, yet he is as important, and plays as great a part in the defense of his country, as the man in uniform.

# BOOKS

FORENSIC CHEMISTRY AND SCIENTIFIC CRIMINAL INVESTIGATION. A. Lucas. *Longmans, Green & Company.* 1935.

This book, which is now in its third edition, has much in it of general interest. The rules laid down in the introduction for the practice of forensic chemistry are well worth adoption in any kind of chemical work. The chemical analytical methods given do not, in many cases, represent the latest developments in analytical science, although they are generally very well documented to the latest work in the forensic field. The absence of illustration, while making necessary comparative testing on the one hand, detracts somewhat from the clarity of the text. Anyone, however, who is interested in the applications of analytical science will find much in the book which will prove of interest.—Karl H. Herstein, F.A.I.C.

PATENTABILITY AND VALIDITY. By Charles W. Rivise, F.A.I.C., and A.D. Caesar. *The Michie Company, Charlottesville, Va.* 1936. $10.00.

"Is my idea patentable?" is often the first question a chemist or other technical worker asks when he develops something which

appears to have commercial value. If it is patentable and he takes the necessary steps to secure a patent, he will sooner or later ask a second question, "Is my patent valid?"

Unfortunately these questions cannot be positively answered by using a single formula as there are many factors, known and unknown, to be considered, plus the further factor of human psychology which is often elusive and uncertain.

In determining whether an invention is patentable, we must first make sure it falls within one of the classes of inventions for which patents are issued. This phase of the subject is thoroughly covered in this book. Numerous illustrative examples are given of actual cases decided by the Patent Office and the courts.

We must then subject the invention to a series of tests which the authors have carefully and lucidly outlined and described. The new idea must possess utility, novelty, and invention in order to be patentable. Each of these three tests are thoroughly and comprehensively explained by the authors, and many citations of actual cases are given in support of their statements. There are fifteen sections under the topic of utility, thirty-five sections under the heading of novelty, and eighty sections devoted to about twenty-four so-called negative rules of invention formulated by the authors.

Separate chapters deal with the question of inventorship; the patent application and its proper disclosure; the drafting of claims, and the steps in Patent Office prosecution.

The forfeiture of patent rights and double patenting are discussed in all their intricate phases. There are many ways by which patent rights may be innocently lost owing to ignorance of the points stressed in this section of the book.

Each subject treated in the thirteen chapters of the book is presented with unusual clarity as well as accuracy. Chemists will find this volume of great value in answering many of their questions relating to patents. Many recent cases involving chemical patents are cited.

This book is not just another elementary exposition of the subject, but a thorough treatise of value to the patent attorney as well as to research workers. In spite of the complexity and difficulty of the subject, the authors have succeeded in presenting their discussion in such manner that it is highly readable and easy to comprehend by one having no legal training.

There is a detailed index which gives instant access to the ma-

terial of the book. Complete citations of all discussions are given in a separate table of cases.

Both authors, having been formerly examiners in the Patent Office and active for many years as patent lawyers, are well qualified by their rich experience to write this authoritative and valuable addition to the literature.—Joseph Rossman.

## Research Work

THE synthetic organic chemicals industry maintained 129 separately organized research laboratories in 1934 as compared with 114 in 1933. About 1,350 technically trained research workers were employed at an average annual salary of $2,864 as compared with 1,060 workers averaging 3,118 in 1933. The net cost of research was $7,629,694 in 1934 as against $6,163,688 in 1933. This expenditure for research in 1934 is equivalent to 4.3 per cent of the value of sales of all synthetic organic chemicals.

A break-down for coal-tar products and products not of coal-tar origin is shown below:

### Coal-tar Products

In 1934 there were 212 producers of dyes and other coal-tar products, of which 76 reported separately organized research laboratories. These laboratories employed 664 technically trained research workers in 1934 at an average annual salary of $3,016 as compared with 498 workers averaging $3,548 in 1933.

The gross cost of research was $4,170,328 and the net cost $3,809,546. The net cost represents 3.7 per cent of the value of sales of all coal-tar products.

### Synthetic Products not of Coal-tar Origin

There were 628 technically trained research workers employed in the synthetic non-coal-tar chemical industry in 1934 at an average annual salary of $2,695. The gross cost of research was $3,566,810 and the net cost was $3,536,011. This net cost represents 4.9 per cent of the total value of sales of all products in this class.

### Coal-tar and Non-coal-tar Products

Certain manufacturers producing synthetic products both of coal-tar and non-coal-tar origin were unable to separate their research costs. In this group were 57 research workers at an annual

average salary of $2944. The gross cost of research was $308,728 and the net cost $284,137.

*—Report No. 101, United States Tariff Commission. —Dyes and other Synthetic Organic Chemicals in the United States —1934*

It is refreshing and very encouraging to note that in a time of acute business depression the synthetic organic chemical industry increased the relative number of research organizations and employed a larger number of chemists and other technically trained workers. Surely, an industry that can continue and even increase its research activities in a period of world-wide depression must possess remarkable vitality.

The record of the American synthetic organic chemical industry is a noteworthy one and its establishment has created careers for trained workers and has encouraged the profession of chemist. It is the great training ground for future progress.

*—James N. Taylor, F.A.I.C.*

## *"Believe It or Not" Regarding Niagara Falls*

**By F. L. Koethen, F.A.I.C.**

**The height of the Falls is greater when less water is going over, than at high water.**

The wind over Lake Erie produces great changes in the volume of water in Niagara River. High water, of course, makes the crest of the Falls higher, but the water below the Falls is raised more than this amount because of crowding in the narrow gorge of Whirlpool Rapids, so net height of fall is four to five feet less.

**At several periods in the history of Niagara, the Niagara River carried the water from Lake Erie only.**

The other lakes emptied into the Mississippi or the Ottawa. The Falls cut only a narrow gorge during these periods. The changes were caused by the Great Glacier. Read "The Falls of Niagara", an authoritative book by a Niagara chemist, Dr. Glenn Forrester.

**At times during migration periods, wild geese or swans are unable to rise from the surface of Niagara River and are carried over the Falls and killed.**

This occurs when the wind blows in the same direction as the current and the birds cannot oppose the wind with sufficient speed to rise.

**Niagara's famous electro chemical center is North of Canada.**

The Niagara river runs westward at this point. One can stand in the Caustic Capital and look southward across the river to Canada. You are a long way from home!

**A·N D**

**BELIEVE IT OR NOT, Mr. A. I. C.**

**The Niagara Chapter is a bunch of Live Wires, full of Niagara Power.**

Come to the annual meeting May ninth and see!

## Membership Pins and Keys

Pins and keys bearing The American Institute of Chemists emblem are available to Fellows and Associates. Fourteen karat gold pins cost $3.25; ten karat gold pins $2.75; rolled gold pins $0.75. Fourteen karat gold keys cost $8.50; ten karat gold keys $7.00, and rolled gold keys $1.50. These may be obtained from the C. G. Braxmar Company, Inc., 242 West 55th Street, New York, N. Y., upon presentation of card of authorization from the Secretary, or they may be ordered through Howard S. Neiman, Secretary, 233 Broadway, New York, N. Y.

# COUNCIL

## OFFICERS

*President,* M. L. CROSSLEY
*Vice-President,* ARTHUR J. HILL
*Secretary,* HOWARD S. NEIMAN
*Treasurer,* ALAN PORTER LEE

## COUNCILORS

ROSS A. BAKER
FREDERICK E. BREITHUT
FRANK G. BREYER
HANS T. CLARKE
HENRY G. KNIGHT
HERBERT R. MOODY
W. T. READ
NORMAN A. SHEPARD
WALTER T. TAGGART
FLORENCE E. WALL
FREDERICK W. ZONS

## CHAPTER REPRESENTATIVES

| *New York* | *Niagara* | *Philadelphia* | *Washington* |
|---|---|---|---|
| LLOYD VAN DOREN | ARTHUR W. BURWELL | C. W. RIVISE | C. W. WHITTAKER |

### *March Meeting*

The one-hundred and thirtieth meeting of the Council of THE AMERICAN INSTITUTE OF CHEMISTS was held at The Chemists' Club, New York, N. Y., on March 19, 1936, at 5:30 P. M.

President M. L. Crossley presided.

The following officers and councilors were present: Messrs. R. A. Baker, F. G. Breyer, H. T. Clarke, M. L. Crossley, A. P. Lee, H. S. Neiman, N. A. Shepard, F. W. Zons, and Miss F. E. Wall. Miss V. F. Kimball was also present.

The minutes of the previous meeting were approved. The Treasurer's report was read and accepted.

The Jury on Medal Award reported that Marston T. Bogert, F.A.I.C., had been selected to be the recipient of the INSTITUTE medal for 1936. On motion made and seconded, the selection of the Jury on Medal Award was confirmed.

The Secretary read a letter from the Washington Chapter regarding its student medal awards. Upon motion made and seconded, the granting of a student medal to any accredited university or college, regardless of race or creede, was approved, provided that the award is made in accordance with the provisions of Article 5-a of the By-laws of THE AMERICAN INSTITUTE OF CHEMISTS.

The Secretary read a letter from the Niagara Chapter regarding plans for the annual meeting to be held May ninth. Upon motion made and seconded, the program submitted by the Niagara Chapter for the Annual Meeting was adopted with suggestions.

Upon motion made and seconded, the President was requested to appoint a committee to examine the papers which will be read at the annual meeting.

The Secretary read a letter from the Niagara Chapter requesting that the Chapter be permitted to amend its constitution as follows: "Membership (in the Niagara Chapter) shall consist of

all members of THE AMERICAN INSTITUTE OF CHEMISTS residing in or doing business in that part of New York State west of a line running due north and south through the eastern boundary of the City of Batavia."

Upon motion made and seconded, this request was granted, with the suggestion that the Niagara Chapter consider the possibility of including all those cities within a 150 mile radius of Buffalo, especially with respect to Rochester and Erie.

Suggested revisions in the form of the present membership certificate were considered, and the Secretary was requested to have a form of certificate made which incorporates the changes recommended by the Council.

Upon motion made and seconded, it was decided that the INSTITUTE should use its emblem in the form of a pin or key to be worn only by Fellows and Associates.

The following new members were elected:

FELLOWS

DONALD H. ANDREWS, *Professor of* Chemistry, John Hopkins University, Baltimore, Md.

M. R. BHAGWAT, *Secretary*, Chemists' Unemployment Committee, 300 Madison Avenue, New York, N. Y.

LUCIUS A. BIGELOW, *Associate Professor of Chemistry*, Duke University, Durham, N. C.

T. F. BRADLEY, *Research Chemist*, American Cyanamid Company, Tremley Laboratory, Linden, N. J.

JOHN F. BROEKER, *Head of Paint Research*, Krebs Pigment and Color Corporation, Newport, Delaware.

KENNETH E. BURGESS, *Director of Technical Service*, Magnetic Pigment Company, Trenton, N. J.

EDMUND BURKE, SR., *Chemist and Meteorologist*, Montana Agricultural Experiment Station, Bozeman, Montana.

ARTHUR W. CARPENTER, *Manager of Testing Laboratories*, The B. F. Goodrich Company, Akron, Ohio.

BEVERLY L. CLARKE, *Research Chemist*, Bell Telephone Laboratories, New York, N. Y.

LEE DAVIDHEISER, *Professor*, Wagner College, Staten Island, N. Y.

GEORGE L. FREAR, *Research Chemist*, Tennessee Valley Authority, Wilson Dam, Alabama.

W. A. GIBBONS, *Director*, U. S. Rubber Products, Inc., Passaic, N. J.

WILLIAM L. HALE, *Chief Chemist*, The Debevoise Company, Brooklyn, N. Y.

W. A. HAMMOND, *Consultant and Manufacturer*, Yellow Springs, Ohio.

V. N. IPATIEFF, *Associate Director of Research*, Universal Oil Products Company, Chicago, Ill.

WILLARD LEROY MORGAN, *Special Research and Development Chemist*, Sylvania Industrial Corporation, 122 E. 42nd Street, New York, N. Y.

HARLEY A. NELSON, *Chief*, Paint and Ceramic Research Division, N. J. Zinc Company, Palmerton, Pa.

A. L. OMOHUNDRO, *Director of Plant and Laboratories*, McKesson and Robbins, Inc., Bridgeport, Conn.

ALAN H. RICHARDSON, Laurence M. Marks and Co., 49 Wall Street, New York, N. Y.

ANDREW J. SNYDER, *Research Chemist*, Kentucky Color and Chemical Co., Louisville, Ky.

STUDENT

JOSEPH J. KALISZ, *Student*, University of Alabama, University, Ala.

Dr. Breyer discussed plans of the Committee on Unemployment to make a survey of the profession of chemistry.

Upon motion made and seconded, the President was requested to appoint a committee on constitutional revision to

consider the matter of having membership in THE AMERICAN CHEMICAL SOCIETY made a prerequisite for membership in the INSTITUTE.

There being no further business, adjournment was taken.

## CHAPTERS

### New York

*Chairman,* BURKE H. KNIGHT *Vice-chairman,* JEROME ALEXANDER
*Secretary-treasurer,* WALTER J. BAEZA
52 East 41st Street
New York, N. Y.

### Pennsylvania

*Chairman,* MAX TRUMPER *Vice-chairman,* LOUIS D. NEWITT
*Secretary-treasurer,* CHARLES W. RIVISE
1321 Arch Street
Philadelphia, Penna.

### Washington

*Honorary President,* CHARLES E. MONROE
*President,* COLIN W. WHITTAKER *Vice-president,* LOUIS N. MARKWOOD
*Treasurer,* JAMES H. HIBBEN
*Secretary,* FRANK O. LUNDSTROM
4012 Davenport Street, N.W.
Washington, D. C.
*News Reporter to* THE CHEMIST, R. B. DEEMER

### Niagara

*Chairman,* CHARLES F. SMITH *Vice-chairman,* GROVES H. CARTLEDGE
*Secretary-treasurer,* HOWARD W. POST
3435 Main Street
Buffalo, New York
*News Reporter to* THE CHEMIST, ALBERT L. HALL

## Our New Members

DONALD H. ANDREWS, F.A.I.C., obtained the Ph.D. degree from Yale, and was research associate at the University of California, national research fellow, Leiden, Holland, and research fellow of the Bartol Foundation of Franklin Institute. Author of many articles, he specializes in low temperature measurements and applied thermodynamics. He is professor of chemistry at Johns Hopkins University.

M. R. BHAGWAT, F.A.I.C., received the B.Sc. degree from Bombay University, India, and the M.A. degree from

Columbia University. Specializing in chemical engineering, process development, organic and inorganic chemistry, synthetic plastics, operation of plants, he is familiar with major unit operations and chemical economics. He is Secretary of the Chemists' Unemployment Committee, 300 Madison Avenue, New York, N. Y.

LUCIUS A. BIGELOW, F.A.I.C., studied at Massachusetts Institute of Technology, Harvard University, and has the Ph.D. degree from Yale University. Author of a number of articles in the *Journal of The American Chemical Society* and the *Journal of the Chemical Society (London)*, he is associate professor of chemistry at Duke University, Durham, N. C.

THEODORE F. BRADLEY, F.A.I.C., was a student of Rensselaer Polytechnic Institute and at Rutgers University. Specializing in paints, varnishes, lacquers, synthetic resins, organic acids and esters, and drying oils, he holds many patents, and is the author of several articles on these subjects. He is research chemist with American Cyanamid Company, Linden, N. J.

JOHN F. BROEKER, F.A.I.C., obtained the B.S. degree from the University of Louisville, and the Master Ch.E. degree from Purdue University. Specializing in pigments for use in paint, oil cloth, linoleum, etc., he is the author of several publications on the subject. He is the head of paint research for Krebs Pigment and Color Corporation, Newport, Delaware.

KENNETH E. BURGESS, F.A.I.C., received the M.A. degree from the University of Toronto. Specializing in high explosives, paint, lacquer, varnish, and pigments, he is director of technical service for Magnetic Pigment Company, Trenton, N. J.

EDMUND BURKE, F.A.I.C., was graduated from Montana State College and studied at the graduate schools of Cornell University and Michigan Agricultural College. Author of many articles on agricultural subjects, he specializes in the influence of alkali on concrete, the incubation of eggs, animal nutrition, soils, and plant nutrition. He is chemist and meteorologist at Montana Agricultural Experiment Station, Bozeman, Montana.

ARTHUR W. CARPENTER, F.A.I.C., has S.B. and S.M. degrees in chemical engineering from Massachusetts Institute of Technology. Specializing in the chemistry and manufacture of rubber products, and water purification, he is the author of several technical articles. His position is manager of testing laboratories of the B. F. Goodrich Company, Akron, Ohio.

BEVERLY L. CLARKE, F.A.I.C., received the B.S. degree from George Washington University, and the Ph.D. from Columbia. Specializing in physical, inorganic, colloid, and analytical chemistry, and electrometric titration, he is research chemist at Bell Telephone Laboratories, New York, N. Y.

LEE DAVIDHEISER, F.A.I.C., was graduated from Ursinus College with the A.B. degree and from Johns Hop-

kins University with the Ph.D. degree. He specializes in gas adsorption and gases, and is professor in chemistry and physics and past head of the department of science of Wagner College, Staten Island, New York.

GEORGE L. FREAR, F.A.I.C., attended Pennsylvania State College and received the Ph.D. degree from Yale University. Specializing in general and physical chemistry, metallurgy and metallography, petroleum, acids, alkalies, and salts, he is author of several papers. He is chemist and project leader in the investigation of phosphorus and phosphates for the Tennessee Valley Authority, Wilson Dam, Alabama.

W. A. GIBBONS, F.A.I.C., has the A.M. degree from Wesleyan University, and the Ph.D. degree from Cornell. Author and joint author of papers on electrochemical oxidation of hydrazine, heat of dilution, addition compounds, materials used in aviation, vulcanization of rubber, he holds several patents in these fields. Specializing in rubber technology, he is director of development of U. S. Rubber Company, Passaic, N. J.

WILLIAM L. HALE, F.A.I.C., is a graduate of the Polytechnic Institute of Brooklyn. Specializing in paints, he is chief chemist of the Debevoise Company, Brooklyn, N. Y.

W. A. HAMMOND, F.A.I.C., received the A.B. degree from Miami University and the Ph.D. degree from Ohio State University. Specializing in the chemistry and technology of gypsum and gypsum products; soluble anhydrite as a desiccating agent; drying of organic liquids; chemical education and industrial contact, he is consulting chemist at Yellow Spring, Ohio.

V. N. IPATIEFF, F.A.I.C., is professor at Northwestern University, Evanston, Illinois, and director of chemical research for Universal Oil Products Company, Chicago. Specializing in the field of petroleum he has published more than two hundred articles, and holds more than seventy patents.

JOSEPH J. KALISZ, S.A.I.C., is a student in the chemistry department of the University of Alabama, University, Alabama.

WILLARD L. MORGAN, F.A.I.C., studied at Massachusetts Institute of Technology, and holds the M.S. degree from the University of California. Specializing in waterproofing, moistureproofing, fireproofing, dyes, dyeing, latex, rubber, laminated glass, mirrors, photoengraving, celluloid, cellulose esters, synthetic resins, lacquers, plastic molding, adhesives, printing, regenerated cellulose paper, foodstuffs, patents and patent suits, he is the author of many articles. He is special research and development chemist with Sylvania Industrial Corporation, New York, N. Y.

HARLEY A. NELSON, F.A.I.C., graduated from McPherson College and Kansas University. Specializing in problems pertaining to the protective coatings industries, he has published several articles. He is chief of the Paint and Ceramic Research Division

of the New Jersey Zinc Company, Palmerton, Pennsylvania.

A. L. OMOHUNDRO, F.A.I.C., holds the Ph.D. degree. Specializing in pharmaceutical chemistry, he is director of plant and laboratories of McKesson and Robbins, Inc., Bridgeport, Conn.

ALAN H. RICHARDSON, F.A.I.C., obtained the B.S. degree from Rutgers University and the Ph.D. degree from Columbia. Specializing in gas solubility, (author of a paper on this subject), and analysis of chemical industry, he is industrial analyst with Laurence M. Marks and Company, New York, N. Y.

ANDREW J. SNYDER, F.A.I.C., holds degrees from Carroll College and the University of Wisconsin. Specializing in dry color pigment research, he is author of a number of papers on this subject. He is employed as research chemist by the Kentucky Color and Chemical Company, Louisville, Ky.

## CHEMISTS ABROAD

### By James N. Taylor, F.A.I.C.

"CHEMISTS As Financial Advisers" is the title of an editorial in *Canadian Chemistry and Metallurgy* (*Toronto*) for February in which will be found much food for thought. The editorial is quoted herewith in part.

"Views have been passing round among various bodies in Great Britain recently, clarifying the position and opinion of different interests on the need for professional chemical advice of a financial nature, and just who would be expected to supply it.

"The Chancellor of the Exchequer, Mr. Neville Chamberlain, addressed a letter to the Chairman of the London Stock Exchange, and through him to the banks, issuing houses, and members of the Stock Exchange, expressing his desire to check dubious and unsound company flotations, especially ventures designed to exploit scientific processes.

"The Institute of Chemistry of Great Britain and Ireland brought this subject to the attention of members in a recent issue of its proceedings. The Chancellor went a little further in his communication, indicating to those whom he addressed that he had ascertained that the Department of Scientific and Industrial Research, the Medical Research Council, and the Agricultural Research Council, were willing, if asked in a particular instance, to suggest the names of scientists of high standing who could be invited to furnish reports on the scientific merits of the proposals upon which a public issue of stock was put forward.

"The Departments of the Government thus mentioned indicated . . . that they had no intention of changing their present policy of referring such questions to the particular learned institutions whose fields of activity were implicated . . . The British view is generally clear on the whole professional area in which these points come, and it would be desirable if Govern-

ments, Provincial and Dominion, in Canada, were conscious of the merits and soundness of this policy . . .Our chemists are still a little too busy looking to their science, and not active enough in seeking opportunities for public service in a joint expression of professional influence."

DR. R. H. PICKARD, F.R.S., has been nominated for election as President of the Institute of Chemistry in succession to Professor Jocelyn Thorpe, C.B.E., F.R.S., who has been nominated for election as a Vice-president. — *Chemistry and Industry. (London).*

IN THE FUTURE all German chemical associations will be grouped, according to the plan of the "Reichsgemeneinschaft der technisch-wissenschaftlichen Arbeit," into the "Bund Deutscher Chemiker" specially created for that purpose. This association is proposed with the object of rational collaboration among all chemists of whatever group, in the different fields of science and industry, in intimate liaison with the public.

DR. FRANZ STRUNZ, Professor in the Vienna Technischen Hochschule recently delivered an address on "Alchemie und Technik" — a chapter from the history of chemistry—before the Union of Austrian Chemists. His address in abstract form was published in the February 15 issue of the *Oesterreichische Chemiker-Zeitung. (Vienna).*

THE RT. HON. THE VISCOUNT LEVERHULME has accepted the invitation of the Council of the Society of Chemical Industry to be elected president for 1936-1937 in Liverpool next July and to take office immediately after the Annual Meeting there.

DR. A. FRY, Berlin, has been appointed Professor in the Berlin Technischen Hochschule, and simultaneously at the Chemisch-Technischen Reichsanstalt as Director of the Section for Metallurgy.—*Chemiker-Zeitung. (Kothen).*

IN EXERCISE of the powers vested in the Government of India for the administration and management of the properties and funds of the Indian Institute of Science in Bangalore, the Viceroy has appointed a committee consisting of Sir James Irvine, Principal and Vice-chancellor of the University of St. Andrews (chairman), Dr. A. M. Mackenzie, Vice-chancellor of Osmania University (Hyderabad), and Dr. S. S. Bhatnagar, Professor of Chemistry in Punjab University, as members. — *Chemistry and Industry (London).*

DR. WOJCIECH SWIETOSLAWSKI, eminent Polish chemist and savant has been named by the President of the Republic of Poland as Minister of Public Instruction.—*Chimie et Industrie (Paris).*

DR. J. B. COLLIP, F.C.I.C., professor of organic and biological chemistry at McGill University, has been awarded the Flavelle Medal of the Royal Society of Canada for outstanding achievements in the field of science. Dr. Collip contributed valuable research in the development of insulin, and has more recently been prominently associated with major medical work on glands of internal secretion. — *Canadian Chemistry and Metallurgy (Ottawa).*

"The time has come," the Walrus said,
"To talk of many things:
Of shoes—and ships—and sealing wax—
Of cabbages—and kings—"
The Walrus and the Carpenter

In a Laboratory Manual prepared for the students in elementary inorganic chemistry at New York University, of which he was the author, the late Dr. Morris Loeb had the following laboratory maxims printed:

There is no such phrase as "clean enough".

Never scrub off to-morrow, what you can dissolve to-day.

Towels are used for drying, not for rubbing off dirt.

Neighbors' eyes were not meant for targets, nor their noses for fume-receptacles.

Glass and porcelain are not able to stand sudden changes of temperature.

Weights and hot crucibles should not be held in the fingers.

Note-books have good memories; jottings on loose paper are useful when you can find them.

An unrecorded experiment was never begun.

Chemical equations explain reactions, but do not describe them.

Too much of reagent is as bad as too little; and the latter fault can be remedied.

Repairing damages takes much longer than avoiding them.

The following gem from the *Official Gazette of the United States Patent Office* shows what happens when foreigners translate their own patent specifications: "Apparatus for inexplosively storing and drawing off igniferous liquids."

### *Ode to the Lactic Acid Bacillus*

Hail to thee, germ philanthropic!
Greetings, O noble bacillus!
Humbly thy help I petition, menaced by early senescence:
Evil albuminoids threaten, while I affrightedly harbor
Phenol ingredients!
Happy the pure protozoan, limpid, intransitive, deathless!
I, with diversified tissues, functionate feebly, and perish:
Harmful intestinal flora, low, deleterious indols
Frustrate longevity.
Come, thou acidulous atom, let me absorb and possess thee;
Give thee a dwelling eupeptic, feed thee with minimum toxins,
And for thy chosen companions, colonize mild and benignant
Glycobacteria!
Come in proliferate power, kind Metchnikoffian microbe!
Stimulate sanative cultures, banish these auto-infections!
Let us go forward, triumphant, joyous, immune, and asceptic,
Unto Millennium!

*—Corrine Rockwell Swain, in The Century.*

Chemists and bacteriologists will be interested in the following bit of commercial literature:

The XXX filter consists of alternate plates of copper and aluminum separated by layers of sand and coke and it is said that "the plates which separate the various materials used in the XXX filter are alternately of aluminium and copper which, with the carbon between them, set up an immediate and effective galvanic current. The effect of this galvanic action is threefold, the current in itself kills many of the bacilli and at the same time resolves a portion of the water into its constituent gases, oxygen and hydrogen. Hydrogen is fatal to most germs and kills them; should any escape, which is virtually impossible, the oxygen causes such rapid internal combustion in any remaining, that they would speedily burn themselves out. So no escape is possible. It may be argued that the dead bacilli are injurious, but such is not the case. They cannot escape from the filter, they cannot return to life, and are removed at each cleaning of the filter."

### *New Vitamin?*

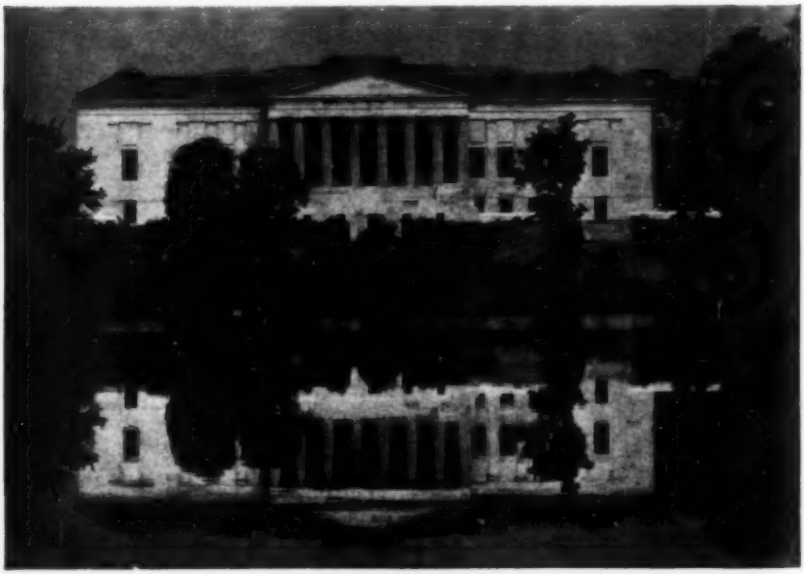
She was crying.

"I'll kiss those tears away," said the big man from the West.

He did his best but the tears flowed on.

"Will nothing stop them?" he asked breathlessly.

"No," she murmured. "It's hay fever, but go on with the treatment."



*Historical Building, Buffalo*

**Buffalo Apparatus Corporation**

**180 Main Street**

**Buffalo, N. Y.**

***Apparatus and Chemical Reagents for Industrial and Educational Laboratories***

---

**Buffalo Testing Laboratories, Inc.**

**Gerrans Building**

**Buffalo, N. Y.**

***Analytical and Consulting Chemists***

---

**Larkin Company, Inc.**

**Buffalo, N. Y.**

**Welcome, Members of A. I. C. to Buffalo**

---

***Compliments of***

**Niagara Alkali Co.**

**Niagara Falls, N. Y.**

---

**Niagara Smelting Corporation**

**2710 GRAYBAR BUILDING NEW YORK CITY**

***Manufacturers of:*** **Caustic Soda, Electrolytic Bleaching Powder, Carbon Tetrachloride, Silicon Tetrachloride, Titanium Tetrachloride, Sulfur Chloride.**

---

**U. S. RUBBER RECLAIMING CO., Inc.**

**Buffalo, N. Y.**

***Manufacturers of Reclaimed Rubber***

---

**Vanadium Corp. of America**

***Manufacturers of Ferro Alloys***

**NIAGARA FALLS, N. Y.**

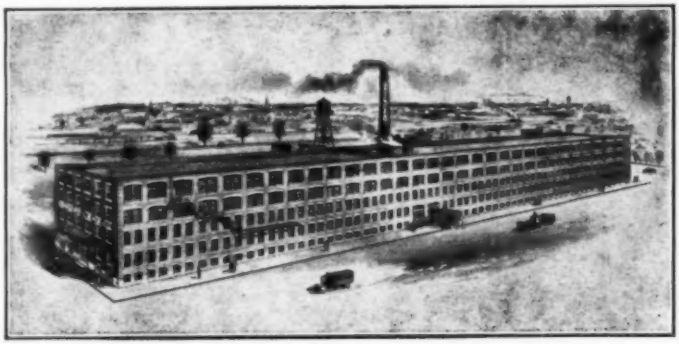
---

Welcome

to

BUFFALO,

N. Y.



You are invited to visit the

SPENCER LENS COMPANY FACTORY

DOAT AT GENESEE STREETS

BUFFALO, N. Y.

An opportunity for a tour thru the factory and to examine complete microscopes and accessories as well as those in process of manufacture.

NIACET PRODUCTS

Glacial & U. S. P. Acetic Acid
Acetaldehyde
Acetal
Aldol
Acetamide
Aluminum Acetate and Formate
Crotonaldehyde
Crotonic Acid
Ethyl Crotonate
Iron Acetate
Methyl Acetate
Paraldehyde

ACETIC ACID
Glacial & U. S. P.

ALDEHYDES

ACETATE SALTS
Largest Domestic Producer

*For samples and information write*

NIACET
CHEMICALS CORPORATION
Sales Office and Plant Niagara Falls, N.Y.

# ALOX CORPORATION

MANUFACTURERS OF: "Oiliness" Compounds . . . Fat-Liquors . . . Antiseptic Compounds . . . Rubber Activators . . . Anti-Corrosion Materials . . . Organic Acids . . . Soaps . . . Anti-Fouling Materials —

FOR THE: Lubricating Oil . . . Leather . . . Pharmaceutical . . . Specialty . . . Paint . . . Textile . . . Metal . . . Rubber and Allied Industries.

**Technical Bulletins furnished free on request.**

| FACTORY | MAIN OFFICE |
|---|---|
| Buffalo Ave. & Iroquois St. | 55 William St. |
| Niagara Falls, N. Y. | New York, N. Y. |
| Phone: 4564 P. O. Box 949 | Phone: JOhn 4-3140 |

# The MATHIESON ALKALI WORKS (Inc.)

MANUFACTURERS OF

CHEMICALS

SODA ASH
CAUSTIC SODA
LIQUID CHLORINE
BICARBONATE OF SODA
AMMONIA ANHYDROUS & AQUA

PURITE MAFOS
GYPSUM PRODUCTS
BLEACHING POWDER
CARBON DIOXIDE ICE
H T H HYPOCHLORITE PRODUCTS

EXECUTIVE OFFICES

**60 EAST 42nd STREET, NEW YORK**

## Colloid Mills and Emulsifiers

Capacity from 3 gallons per hour up.

The Emulsifiers are used for Oil Emulsions, Cold Creams, Cosmetics, and many other purposes.

The Colloid Mills serve the same purposes, but in addition will cut and grind.

The Colloid Mills have jacket for use with steam, cold water, etc., to maintain a desired temperature.

They are supplied in Bronze and Allegheny Metal.

Advise your requirements and give details of electric current.

**EIMER & AMEND**

*Est.* 1851 *Inc.* 1897

***Headquarters for Laboratory Apparatus and Chemical Reagents***

**THIRD AVE., 18th to 19th STS. NEW YORK, N. Y.**

## THE CHEMIST

**THE CHEMIST** presents articles by leading chemists on professional subjects and on new developments in industry which have professional significance. **THE CHEMIST** offers concentrated news, book reviews, editorials by outstanding chemists.

Brief, attractive, significant, **THE CHEMIST** is a necessity to modern chemists.

**THE CHEMIST**
233 Broadway,
New York, N. Y.

I enclose $2.00 for one year's subscription to be sent to:

Name.....

Address.....

.....

THE CALCO CHEMICAL COMPANY, INC. — BOUND BROOK, N. J.
A DIVISION OF AMERICAN CYANAMID CO.
— Manufacturers of —
DYESTUFFS — CHEMICALS — INTERMEDIATES — PHARMACEUTICALS

Calco

...WHAT you pay per dozen, but what you pay per year for replacements is the basis for figuring economy in laboratory ware.

When your replacements are due mainly to accidental breakage or thermal shock, or clouding from repeated sterilization, you will reduce their quantity and their cost by standardizing on Pyrex Brand Laboratory Glass.

Mechanical strength, heat-resistance and chemical stability prolong its life beyond that of ordinary glassware. For protecting important solutions and valuable time, as well as for reducing replacement costs, order your laboratory glassware by name—specify Pyrex Brand.

*"PYREX" is a registered trade-mark and indicates manufacture by*

CORNING GLASS WORKS • CORNING, NEW YORK

*Pyrex* BRAND

LABORATORY GLASSWARE